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(54) HIGHLY EXTENSIBLE NONWOVEN FABRIC AND ITS PRODUCTION

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a nonwoven fabric having sufficient transverse extensibility with high elongation even under low stress.

SOLUTION: This highly extensible nonwoven fabric with a transverse elongation of $\geq 400\%$ consists of a spun-bonded nonwoven fabric formed of eccentric sheath-core type conjugate fibers made up of the core consisting of (a) a propylene-based polymer 0-5 mol.% in ethylene component content and 5-20 g/10 min in melt flow rate and the sheath consisting of (b) a 2nd propylene-based polymer 0-5 mol.% in ethylene component content with its melt flow rate greater than that of the propylene-based polymer (a) by $\geq 9-20$ g/10 min.

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CLAIMS

[Claim(s)]

[Claim 1] The core part which consists of a propylene system polymer (a) which has an ethylene component content in 0-5-mol the range in which it is %, and is in the range whose melt flow rates are 5-20g / 10 minutes, An ethylene component content is in 0-5-mol the range in which it is %. A melt flow rate consists of a span bond nonwoven fabric formed from the sheath-core mold bicomponent fiber of eccentricity which consists of a sheath which consists of 9-20g / a propylene system polymer (b) big 10 minutes or more from the melt flow rate of said propylene system polymer (a). The high extensibility nonwoven fabric characterized by the lateral rate of expanding being 400% or more.

[Claim 2] The core part which consists of a propylene system polymer (a) which has an ethylene component content in 0-5-mol the range in which it is %, and is in the range whose melt flow rates are 5-20g / 10 minutes, An ethylene component content is in 0-5-mol the range in which it is %. The span bond nonwoven fabric formed from the sheath-core mold bicomponent fiber of eccentricity with which a melt flow rate consists of a sheath which consists of 9-20g / a propylene system polymer (b) big 10 minutes or more from the melt flow rate of said propylene system polymer (a) Maintaining the heating value of the nonwoven fabric which heated by the first rank at temperature lower 10-40 degrees C than the melting point of said propylene system polymer (b), extended 1.2 to 1.6 times to the lengthwise direction, and was subsequently extended The manufacture approach of the high extensibility nonwoven fabric characterized by extending henceforth [the 2nd step] by 1.3 to 3.0 times the die length of the nonwoven fabric extended by the first rank to the lengthwise direction.

[Claim 3] The fineness of said sheath-core mold bicomponent fiber is 3d or less, and the superintendent officer of said span bond nonwoven fabric is 30g/m². The manufacture approach of the high extensibility nonwoven fabric according to claim 2 which is the following.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the nonwoven fabric which has high extensibility in a longitudinal direction in more detail, and its manufacture approach about a high extensibility nonwoven fabric and its manufacture approach.

[0002]

[Background of the Invention] The nonwoven fabric which has extensibility is used for medical care and health material, such as a base fabric for cataplasms, and a disposable diaper, packaging, etc. from the former.

[0003] for example, ERASU, such as a rubber string which usually gives extensibility to a disposable diaper at the waist section, the area-between-the-thighs' section, etc., — the raw material which compound-ized the tick ingredient and the nonwoven fabric which has a blanket-like feel is used. as the manufacture approach of such a raw material, an approach, JP,62-28456,B, etc. which are compounded with a nonwoven fabric through a rubber string etc. see conventionally — as — ERASU, although the approach of having extended the tick ingredient upwards, sticking a nonwoven fabric, and compounding etc. is adopted that such an approach has complicated processing **** — moreover, a rubber string and ERASU — since a tick ingredient is used in the condition of having contracted, the compounded nonwoven fabric tends to serve as a letter of a pleat, and it tends to cause an infantile rash — it comes out. Such a problem is generated when the extensibility of the nonwoven fabric compounded runs short.

[0004] The attempt which gives the extensibility of a nonwoven fabric is also made. Although the approach of heating and extending the nonwoven fabric which consists of synthetic resin as an approach of giving extensibility to a nonwoven fabric at the temperature more than softening temperature below the melting point of resin is indicated by WO No. 23109 [94 to], the nonwoven fabric which has extensibility sufficient by this approach is not obtained.

[0005]

[Objects of the Invention] This invention is made in view of the above conventional techniques, has sufficient extensibility for a longitudinal direction, and aims at offering the nonwoven fabric with big elongation and its manufacture approach in low stress.

[0006]

[Summary of the Invention] The core part which consists of a propylene system polymer (a) which the high extensibility nonwoven fabric concerning this invention has an ethylene component content in 0-5-mol the range in which it is %, and is in the range whose melt flow rates are 5-20g / 10 minutes, An ethylene component content is in 0-5-mol the range in which it is %. A melt flow rate consists of a span bond nonwoven fabric formed from the sheath-core mold bicomponent fiber of eccentricity which consists of a sheath which consists of 9-20g / a propylene system polymer (b) big 10 minutes or more from the melt flow rate of said propylene system polymer (a). It is characterized by the lateral rate of expanding being 400% or more.

[0007] The core part which consists of a propylene system polymer (a) which the manufacture approach of the high extensibility nonwoven fabric concerning this invention has an ethylene component content in 0-5-mol the range in which it is %, and is in the range whose melt flow rates are 5-20g / 10 minutes, An ethylene component content is in 0-5-mol the range in which it is %. The span bond nonwoven fabric formed from the sheath-core mold bicomponent fiber of eccentricity with which a melt flow rate consists of a sheath which consists of 9-20g / a propylene system polymer (b) big 10 minutes or more from the melt flow rate of said propylene system polymer (a) Maintaining the heating value of the nonwoven fabric which heated by the first rank at temperature lower 10-40 degrees C than the melting point of said propylene system polymer (b), extended 1.2 to 1.6 times to the lengthwise direction, and was subsequently extended It is characterized by extending henceforth [the 2nd step] by 1.3 to 3.0 times the die length of the nonwoven fabric extended by the first rank to the lengthwise direction.

[0008] In this invention, the fineness of said sheath-core mold bicomponent fiber is 3d or less, and the superintendent officers of said span bond nonwoven fabric are 30 g/m2. It is desirable that it is the following.

[0009]

[Detailed Description of the Invention] Hereafter, the high extensibility nonwoven fabric concerning this invention and its manufacture approach are explained concretely.

[0010] The high extensibility nonwoven fabric concerning this invention consists of a span bond nonwoven fabric formed from the sheath-core mold bicomponent fiber of eccentricity which consists of a core part which consists of a propylene system polymer (a), and a sheath which a melt flow rate becomes from a bigger propylene system

polymer (b) than the melt flow rate of said propylene system polymer (a).

[0011] As for the propylene system polymer (a) which forms a bicomponent fiber, the random copolymer of 5-20g / homopolymer of the propylene which has 10 minutes in the range for 5 - 10g / 10 minutes preferably or a propylene, and alpha olefins, such as ethylene, 1-butene, 1-hexene, and 4-methyl-1-pentene, is mentioned for a melt flow rate (it is the same MFR;ASTM D1238, 230 degrees C, 2.16kg load, and the following). In these, the propylene ethylene random copolymer whose ethylene component content is 0.5-5-mol % is desirable in respect of spinning nature and the flexibility of the nonwoven fabric obtained. Moreover, as for a propylene system polymer (a), it is desirable that Mw/Mn which is the index of molecular weight distribution is in the range of 2-4.

[0012] as the propylene system polymer (b) which forms a bicomponent fiber — MFR — MFR of said propylene system polymer (a) — 9-20g — the random copolymer of 10-20g / homopolymer of the big propylene for 10 minutes or a propylene, and alpha olefins, such as ethylene, 1-butene, 1-hexene, and 4-methyl-1-pentene, is used preferably for 10 minutes. In these, the propylene ethylene random copolymer whose ethylene component content is 0.5-5-mol % is desirable in respect of spinning nature and the flexibility of the nonwoven fabric obtained. Moreover, as for a propylene system polymer (b), it is desirable that Mw/Mn which is the index of molecular weight distribution is in the range of 2-4.

[0013] the sheath-core mold bicomponent fiber which forms the high extensibility nonwoven fabric of this invention — the weight percentage ((a) /(b)) of a propylene system polymer (a) and a propylene system polymer (b) — 5 / 95 - 30/70 — desirable — 10 / 90 - 25/75 — it is in the range of 15 / 85 - 20/80 more preferably.

[0014] By this invention, slipping agents, such as oleic amide and an erucic-acid amide, may be blended with said propylene system polymer (b) at 0.1 - 0.5% of the weight of a rate. When a slipping agent is blended with a propylene system polymer (b), the high extensibility nonwoven fabric obtained is excellent in fuzz-proof nature. Moreover, a slipping agent may be blended with a propylene system polymer (a) in this invention.

[0015] In the high extensibility nonwoven fabric concerning this invention, the lateral rate of expanding is 400 - 600% in 450 - 550% of range more preferably 400% or more. In addition, in this invention, a "lengthwise direction" means the direction which supplies a nonwoven fabric original fabric to a machine, i.e., the flow direction of a nonwoven fabric original fabric, and a "longitudinal direction" means the direction of a right angle, i.e., the flow direction of a nonwoven fabric original fabric and the direction of a right angle, to the direction which supplies a nonwoven fabric original fabric to a machine.

[0016] Moreover, the high extensibility nonwoven fabric of this invention has the desirable thing of the maximum tensile strength for which the tension load at the time of 100% expanding has 5 - 20% of low stress nature preferably 50% or less. furthermore, the thing for which it is low expanding in a lengthwise direction, and has a certain amount of reinforcement in order that a high extensibility nonwoven fabric may not spoil processing suitability — desirable — the tension load at the time of 5% expanding — 250 — they are 500g / 25mm or more preferably g/25mm or more.

[0017] the amount of eyes of a high extensibility nonwoven fabric — usually — 15 - 50 g/m² extent — desirable — 15 - 30 g/m² It is extent. The high extensibility nonwoven fabric concerning this invention can be used for medical care and health material, such as a base fabric for cataplasms, and a disposable diaper, packaging, etc. Moreover, a laminating can be carried out to the nonwoven fabric which has elasticity, and it can also use.

[0018] The high elasticity nonwoven fabric concerning such this invention is obtained by extending the span bond nonwoven fabric which consists of a sheath-core mold bicomponent fiber of eccentricity in at least two steps. As a concrete approach, the weight ratio of a propylene system polymer (a) and a propylene system polymer (b) is set to 5 / 95 - 20/80, for example, by the compound melt spinning method, spinning is carried out and a compound continuous glass fiber filament is manufactured rather than it manufactures a high extensibility nonwoven fabric. As for the amount of eccentricity of the nozzle for spinning at this time, it is preferably desirable that it is 0.1mm or more 0.5mm or more. Next, the spun filament is cooled with a cooling fluid, and with drawing air, tension is applied to a filament and it considers as expected fineness. Uptake of the filament by which spinning was furthermore carried out is carried out on an uptake belt, for example, heat embossing processing is performed, and a span bond nonwoven fabric is obtained. 3d or less of fineness of the sheath-core mold bicomponent fiber of the eccentricity which forms this span bond nonwoven fabric is usually 2d or less preferably.

[0019] A high extensibility nonwoven fabric is obtained by extending under heating of said span bond nonwoven fabric in at least two steps. It heats to temperature lower 10-40 degrees C than the melting point of the propylene system polymer (b) which constitutes first the fiber which forms a span bond nonwoven fabric from the first rank as the concrete manufacture approach of a high extensibility nonwoven fabric, for example, and desirable temperature low 10-25 degrees C, and extends 1.4 to 1.6 times preferably 1.2 to 1.6 times to a lengthwise direction. When draw magnification exceeds 1.6 times, the resin which constitutes fiber may crystallize and a drawing in the latter part may become difficult.

[0020] A drawing is performed by taking over with a delivery roll and adjusting the speed difference of a roll. In order to enlarge the amount of width-of-face contractions, a drawing rate is adjusted so that it may become the following by /1500% preferably hereafter by /2500%. As for Nobuyuki Nobu way length (it takes over with the delivery roll which gives the speed difference during drawing processing, and is the distance between rolls) until it reaches the last draw magnification, in the first rank, it is usually preferably desirable that it is 5m or more 2.5m or more. In this drawing processing, 60% or more, preferably, the amount of width-of-face contractions is adjusted so that it may become 60 - 80%. Moreover, heating of a span bond nonwoven fabric can be performed using oven, an infrared heater, a hot calender roll, a hot-platen heater, etc.

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[0021] subsequently, the die length of the nonwoven fabric extended by the first rank while maintaining the heating value of the nonwoven fabric extended by the first rank in the latter part — it extends 1.5 to 2.5 times preferably 1.3 to 3.0 times. The temperature of the nonwoven fabric at this time is temperature lower 10–40 degrees C than the melting point of a propylene system polymer (b), and desirable temperature low 10–25 degrees C.

[0022] In order to enlarge the amount of width-of-face contractions, a drawing rate is adjusted so that it may become the following by /1500% preferably hereafter by /2500%. In order to enlarge a width-of-face contraction, as for Nobuyuki Nobu way length until it reaches the last draw magnification, it is usually preferably desirable in the latter part, that it is 5m or more 2.5m or more. In this drawing processing, 60% or more, preferably, the amount of width-of-face contractions is adjusted so that it may become 60 – 80%. Moreover, heating of the span bond nonwoven fabric extended by the first rank can be performed using oven, an infrared heater, a hot calender roll, a hot-platen heater, etc.

[0023] Thus, 400% or more of high extensibility nonwoven fabric is obtained for the rate of expanding of the above longitudinal directions by carrying out the vertical drawing of the span bond nonwoven fabric formed from the sheath–core mold bicomponent fiber of eccentricity for a specific scale factor in at least two steps.

[0024]

[Effect of the Invention] The high extensibility nonwoven fabric concerning this invention and its manufacture approach have sufficient extensibility for a longitudinal direction, and can offer a nonwoven fabric with the big elongation in low stress.

[0025]

[Example] Hereafter, although this invention is explained still more concretely based on an example, this invention is not limited to these examples.

[0026] In addition, in this example, using the Instron tension tester, lateral elongatedness measured the 25mm width-of-face x200mm sample on condition that 100mm, and a part for / and 300mm[in speed-of-testing chart rate between chucks of 300mm], and measured the ductility at the time of maximum load.

[0027]

[Example 1] The polypropylene by the grand polymer company (trade name: call it "PP-1" melting point:166 degree C and the following F-601, and 10 MFR:6.5g /, and minutes.), Polypropylene by the grand polymer company (it is called "PP-2" melting point:166 degree C and the following 5800, and 10 MFR:15g /, and minutes. trade name:) Use, perform compound melt spinning, the sheath–core mold bicomponent fiber of the eccentricity whose core part is PP-1 and whose sheath is PP-2 (core part: the weight ratio of a sheath 1:4) is made to deposit on an uptake side, and the amount of eyes is 20 g/m². The span bond nonwoven fabric (fineness of configuration fiber: 3d) was manufactured. By the first rank, the hot–platen heater was made into the heat source for this span bond nonwoven fabric, and it extended at the temperature of 145 degrees C 1.5 times (the 1st roll: a part for part [for /, and 25m 2nd roll:37.5m/], and in the latter part, the hot–platen heater was made into the heat source, it extended at the temperature of 145 degrees C 1.73 times (the 3rd roll: a part for part / for // and 37.5m 4th roll:65m/), and the horizontal extensibility nonwoven fabric be obtained. The elongatedness of the longitudinal direction of this horizontal extensibility nonwoven fabric was 400%.

[0028]

[Example 2] In the example 1, the horizontal extensibility nonwoven fabric was obtained like the example 1 except having made latter draw magnification into 2.0 times (the 3rd roll: a part for part [for /], and 37.5m 4th roll:75m/). The elongatedness of the longitudinal direction of this horizontal extensibility nonwoven fabric was 500%.

[0029]

[Example 3] In the example 1, the horizontal extensibility nonwoven fabric was obtained like the example 1 except having made latter draw magnification into 2.2 times (the 3rd roll: a part for part [for /], and 37.5m 4th roll:82.5m/). The elongatedness of the longitudinal direction of this horizontal extensibility nonwoven fabric was 550%.

[0030]

[Example 4] In the example 1, the horizontal extensibility nonwoven fabric was obtained like the example 1 except having made draw magnification of 1.2 times (the 1st roll: a part for part [for /], and 25m 2nd roll:30m/), and the latter part into 2.75 times (the 3rd roll: a part for part [for /], and 30m 4th roll:82.5m/) for the draw magnification of the first rank. The elongatedness of the longitudinal direction of this horizontal extensibility nonwoven fabric was 450%.

[0031]

[Example 5] In the example 1, the horizontal extensibility nonwoven fabric was obtained like the example 1 except having made draw magnification of 1.4 times (the 1st roll: a part for part [for /], and 25m 2nd roll:35m/), and the latter part into 2.36 times (the 3rd roll: a part for part [for /], and 35m 4th roll:82.5m/) for the draw magnification of the first rank. The elongatedness of the longitudinal direction of this horizontal extensibility nonwoven fabric was 500%.

[0032]

[Example 6] In the example 1, the horizontal extensibility nonwoven fabric was obtained like the example 1 except having made draw magnification of 1.6 times (the 1st roll: a part for part [for /], and 25m 2nd roll:40m/), and the latter part into 2.06 times (the 3rd roll: a part for part [for /], and 40m 4th roll:82.5m/) for the draw magnification of the first rank. The elongatedness of the longitudinal direction of this horizontal extensibility nonwoven fabric was 500%.

[0033]

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[The example 1 of a comparison] Using the same span bond nonwoven fabric as what was used in the example 1, the hot-platen heater was made into the heat source, it extended at the temperature of 140 degrees C 2.0 times (the 1st roll: a part for part [for /], and 25m 2nd roll:50m/), and the horizontal extensibility nonwoven fabric was obtained. The elongatedness of the longitudinal direction of this horizontal extensibility nonwoven fabric was 290%. [0034]

[The example 2 of a comparison] The horizontal extensibility nonwoven fabric was obtained like the example 1 of a comparison except having made whenever [stoving temperature] into 145 degrees C in the example 1 of a comparison. The elongatedness of the longitudinal direction of this horizontal extensibility nonwoven fabric was 340%.

[0035]

[The example 3 of a comparison] Other than having set up draw magnification in the example 1 of a comparison with 2.5 times (the 1st roll: a part for part [for /], and 25m 2nd roll:62.5m/), although it was going to manufacture the horizontal extensibility nonwoven fabric like the example 1 of a comparison, the drawing piece was generated and it was not able to manufacture.

[0036]

[The example 4 of a comparison] It sets in the example 1 and they are 1.1 times (the 1st roll: by 25m/) about the draw magnification of the first rank. The 2nd roll : although it was going to manufacture the horizontal extensibility nonwoven fabric like the example 1 except having set up the draw magnification of 27.5m a part for /and the latter part with 3.0 times (the 3rd roll: a part for part [for /], and 27.5m 4th roll:65m/) (total draw magnification: 3.3 times) In the latter part, the drawing piece was generated and it was not able to manufacture.

[0037]

[The example 5 of a comparison] It sets in the example 1 and they are 1.7 times (the 1st roll: by 25m/) about the draw magnification of the first rank. The 2nd roll : although it was going to manufacture the horizontal extensibility nonwoven fabric like the example 1 except having set up the draw magnification of 42.5m a part for /and the latter part with 1.94 times (the 3rd roll: a part for part [for /], and 42.5m 4th roll:75m/) (total draw magnification: 3.3 times) In the latter part, the drawing piece was generated and it was not able to manufacture.

[0038] The above result is shown table 1.

[0039]

[A table 1]

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表 1

| | 実機例1 | 実機例2 | 実機例3 | 実機例4 | 実機例5 | 実機例6 | 比較例1 | 比較例2 | 比較例3 | 比較例4 | 比較例5 |
|----------------------|---------|---------|-----------|---------|---------|---------|-------|-------|---------|---------|---------|
| 延伸倍率(%) | 2.6 | 3.0 | 3.3 | 3.3 | 3.3 | 3.3 | 2.0 | 2.0 | 延伸切れ | 延伸切れ | 延伸切れ |
| 切限の延伸倍率(倍) | 1.5 | 1.5 | 1.5 | 1.2 | 1.4 | 1.6 | — | — | — | 1.1 | 1.7 |
| 第1ロール/第2ロール (m/分) | 25/37.5 | 25/37.5 | 25/37.5 | 25/30 | 25/35 | 25/40 | 25/50 | 25/50 | 25/62.6 | 25/27.5 | 25/42.5 |
| 第3ロール/第4ロール (m/分) | 37.5/65 | 37.5/75 | 37.5/82.5 | 30/82.5 | 35/82.5 | 40/82.5 | — | — | — | 27.5/65 | 42.5/75 |
| 延伸温度(°C) | 145 | 145 | 145 | 145 | 145 | 145 | 140 | 145 | 145 | 145 | 145 |
| 横方向の延伸倍率(%) | 400 | 500 | 550 | 450 | 500 | 500 | 290 | 340 | — | — | — |

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